

# CBSE Class 12 Mathematics

## (SET-5) Answers key

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### Section A – MCQ Answers

1. 250
  2.  $\frac{2x}{x^2+1}$
  3. 3
  4. Parallel
  5. 4
  6. 0.7
  7. 3
  8. Product of diagonal elements
  9.  $x + y + z = 3$
  10. 7
  11.  $\frac{1}{\sqrt{1-x^2}}$
  12.  $\frac{e^{2x}}{2} + C$
  13.  $P(A \cap B) = P(A)P(B)$
  14.  $\sqrt{20}$
  15. 5/4
  16. 1
  17.  $y = Ce^{2x}$
  18. 6
  19.  $\sin^{-1} x + C$
  20. 0
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### Section B

#### 21. Determinant

$$\begin{aligned} |A| &= (2 \times 4 - 3 \times 1) \\ &= 8 - 3 = 5 \end{aligned}$$

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## 22. Differentiation

$$\begin{aligned} y &= x^3 e^x \\ \frac{dy}{dx} &= 3x^2 e^x + x^3 e^x \\ &= e^x (3x^2 + x^3) \end{aligned}$$

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## 23. Normal Equation

$$\begin{aligned} y &= x^2 \\ dy/dx &= 2x \end{aligned}$$

At  $x=2 \rightarrow$  slope = 4

Normal slope =  $-1/4$

Point (2,4)

$$y - 4 = -\frac{1}{4}(x - 2)$$

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## 24. Integration

$$\begin{aligned} \int (3x^2 + 2x) dx \\ = x^3 + x^2 + C \end{aligned}$$

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## 25. Unit Vector

Vector = (1,2,2)

Magnitude:

$$= \sqrt{1 + 4 + 4} = 3$$

Unit vector:

$$\frac{1}{3}i + \frac{2}{3}j + \frac{2}{3}k$$

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### 26. Probability (Red Card)

Red cards = 26

$$P = 26/52 = 1/2$$

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### Section C

#### 27. Solution

$$x = 4$$

$$y = 1$$

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#### 28. Differentiation

$$x^2 + y^2 = 10$$

$$2x + 2y \frac{dy}{dx} = 0$$

$$\frac{dy}{dx} = -\frac{x}{y}$$

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#### 29. Definite Integral

$$\begin{aligned} & \int_0^2 (x^2 + 1) dx \\ &= \frac{8}{3} + 2 \\ &= \frac{14}{3} \end{aligned}$$

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#### 30. Parallel

$$(2,2,2) = 2(1,1,1)$$

Hence parallel.

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**31. Exactly Two Heads (3 Tosses)**

$$= 3C_2(1/2)^3$$
$$= 3/8$$

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**32. Differential Equation**

$$dy/dx = 3x^2$$
$$y = x^3 + C$$

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**33. Area**

$$\int_0^2 x^2 dx$$
$$= \frac{8}{3}$$

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**34. Plane Equation**

Parallel plane  $\rightarrow$  same normal (2,-1,1)

$$2(x - 1) - (y - 2) + (z - 3) = 0$$
$$2x - y + z = 3$$

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**Section D****35. Determinant**

$$|A| = 4$$

Since  $\neq 0 \rightarrow$  invertible

$$A^{-1} = \frac{1}{4} \begin{bmatrix} 3 & -1 & -1 \\ -1 & 3 & -1 \\ -1 & -1 & 3 \end{bmatrix}$$

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**36. Rolle's Theorem**

$$f(-1)=0$$

$$f(1)=0$$

$$f'(x) = 3x^2 - 1$$

$$3c^2 - 1 = 0$$

$$c = \pm \frac{1}{\sqrt{3}}$$

Condition satisfied.

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**37. Integration by Parts**

$$\int x^2 \sin x dx$$

$$= -x^2 \cos x + 2x \sin x + 2 \cos x + C$$

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**38. Shortest Distance**

Using formula:

$$SD = \frac{|(a_2 - a_1) \cdot (b_1 \times b_2)|}{|b_1 \times b_2|}$$

(Final value after solving = 3)

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**39. Binomial (n=4, p=1/3)**

Mean:

$$np = 4/3$$

Variance:

$$npq = \frac{4}{3} \times \frac{2}{3} = \frac{8}{9}$$

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#### 40. Differential Equation

$$\frac{dy}{dx} - y = e^x$$

$$\text{IF} = e^{-x}$$

Solution:

$$y = Ce^x + \frac{e^x}{2}$$